

WHAT IS CLAIMED IS:

1 A mobile terminal that can be connected in a mobile mode between an infrastructure network and an ad hoc network, said infrastructure network being a permanent network interconnected via a relay node, said ad hoc network being a temporary network formed of only plural terminals, said infrastructure network having plural mobile terminals, relay nodes, and a server which provides information needed for connection of mobile terminals; and

wherein an infrastructure network connection procedure and an ad hoc network connection procedure are configured in an integrated mode in an address management process, a connection network identification process and a destination address capture process which are needed when said mobile terminal is connected to a network to establish communications;

wherein each process including steps of identifying whether a network to which said mobile terminal is connected is an ad hoc network or infrastructure network and then using a procedure corresponding to the connected network.

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2 A mobile terminal that can be connected in a mobile
mode between an infrastructure network and an ad hoc
network, said infrastructure network being a permanent
network interconnected via a relay node, said ad hoc
5 network being a temporary network formed of only plural
terminals, said infrastructure network having plural
mobile terminals, relay nodes, and a server which provides
information needed for connection of mobile terminals,
said mobile terminal comprising:

- 10 a. receive packet input means for inputting as a
receive packet a packet transmitted onto a
communication medium configuring a network to be
connected;
- b. transmission packet output means for transmitting a
15 transmission packet onto said communication medium;
- c. means for inputting an opposite communication
party's name of said mobile terminal itself;
- d. means for outputting a destination address
20 corresponding to said opposite communication party's
name;
- e. address management means for receiving said receive
signal, for identifying whether or not said network
to be connected is said infrastructure network or ad
hoc network, and for transmitting said transmission
25 packet which captures and manages an address used in

said network;

f. destination address capture means for receiving said receive signal, for identifying whether or not said network to be connected is said infrastructure network or ad hoc network, for outputting said transmission packet to capture said destination address corresponding to said opposite communication party's name, and for obtaining a destination address of said opposite communication party's name; and

g. move management means for receiving said receive packet and outputting said transmission packet to manage whether or not said movable terminal itself has moved from said network to be connected to another network.

3 The mobile terminal defined in claim 2, wherein said address management means comprises:

a. ad hoc/ infrastructure network identification means for identifying whether or not a network to be connected by said mobile terminal itself is said infrastructure network or said ad hoc network in response to said receive packet, for outputting a network identification signal representing a network to which a network to be connected by said mobile terminal itself is connected, for outputting an infrastructure network connection signal when said

network to be connected is said infrastructure network, and for outputting an ad hoc network connection signal when said network to be connected is said ad hoc network;

5 b. infrastructure network address management means for receiving said receive packet and said infrastructure network connection signal, for outputting necessary transmission data as said transmission packet, and for managing an address used by said mobile terminal itself when a network to be connected by said mobile terminal itself is an infrastructure network;

10 c. ad hoc network address management means for receiving said receive packet and said ad hoc network connection signal, for outputting necessary data as said transmission packet, and for managing an address used by said mobile terminal itself when said network to be connected by said mobile terminal itself is an ad hoc network; and

15 d. a switch for receiving said network identification signal, said transmission packet from said infrastructure network address management means, and said transmission packet from said ad hoc network address management means, for selectively outputting said transmission packet from said infrastructure network address management means by said network

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identification signal when a network in a connection state to said mobile terminal itself is an infrastructure network, and for selectively outputting said transmission packet from said ad hoc network address management means when said network in a connection state is an ad hoc network.

4 The mobile terminal defined in claim 3, wherein said ad hoc/ infrastructure network identification means comprises:

a. infrastructure network advertisement message receive means for receiving an infrastructure network advertisement message containing a network address of an infrastructure in response to said receive packet and for outputting an infrastructure network advertisement message receive signal representing that said infrastructure network advertisement message has been received when said infrastructure network advertisement message contains a network address equal to a network address of a network connected to said mobile terminal itself;

b. ad hoc network advertisement message receive means for receiving an ad hoc network advertisement message containing a network address of an ad hoc network in response to said receive packet and for outputting an ad hoc network advertisement message receive signal

representing that said ad hoc network advertisement message has been received when said ad hoc network advertisement message contains a network address equal to a network address of a network connected to said mobile terminal itself;

c. a first counter for performing a reset operation by receiving said ad hoc network advertisement message receive signal and a reset signal, counting the number of ad hoc network advertisement messages, and outputting the number of said ad hoc network advertisement messages every time said reset signal is received;

d. a second counter for performing a reset operation by receiving said infrastructure network advertisement message receive signal and said reset signal, counting the number of infrastructure network advertisement messages, and outputting the number of said infrastructure network advertisement messages every time said reset signal is received;

e. a timer for measuring a predetermined period of time and then outputting said reset signal when a time-out occurs;

f. an adder for adding an output from said first counter and an output from said second counter;

g. a first comparator for comparing the output from

said first counter with zero to obtain a result,
outputting the result as said infrastructure network
connection signal, and outputting data which creates
said network identification signal;

- 5 h. a second comparator for comparing the output from
said second counter with zero to obtain a result and
outputting said result to said decoder which creates
said network identification signal and to an encoder
which creates said ad hoc network connection signal;
10 and
- i. a third comparator for comparing the output from
said adder with zero to obtain a result and
outputting said result to said decoder which creates
said network identification signal and to an encoder
15 which creates said ad hoc network connection signal;
- j. said decoder receiving signals from said first, said
second, and said third comparators to create an
infrastructure or ad hoc network connection signal;
- 20 k. said encoder receiving signals from said second and
said third comparators and then encoding said ad hoc
network connection signal representing whether or not
said mobile terminal itself configures a new ad hoc
network or said mobile terminal itself is connected
25 to an existing ad hoc network, based on said input
signal.

5 The mobile terminal defined in claim 3, wherein said ad
hoc network address management means comprises:

5 a. ad hoc network/ network address management means for
receiving said receive packet and said ad hoc network
connection signal, outputting a message requesting a
network address containing a network address used in
a new ad hoc network when a new ad hoc network is
configured for connection as said transmission packet
and a message representing a spent network address
10 when said ad hoc network/ network address request
message containing said spent network address in an
ad hoc network connected by said mobile terminal
itself has been received, capturing a network address
of an ad hoc network to which said mobile terminal
15 itself is connected, based on said receive packet,
outputting a network address captured signal
representing that the captured network address and
the network address have been captured, and managing
said captured network address not to be used in an
20 overlap mode; and

b. an hoc network/ terminal address management means
for receiving said receive packet, said ad hoc
network connection signal, said captured network
address, and said network address captured signal,
25 outputting as said transmission packet a message

requesting a terminal address list being used in said
ad hoc network when said mobile terminal is connected
to an existing ad hoc network and a message
containing said terminal address list held by said
mobile terminal itself in response to said address
list requesting message, capturing a terminal address
used in an ad hoc network to be connected by said mobile
terminal itself, based on said receive packet and
said ad hoc network connection signal, and
acknowledging a terminal address to be used in said
ad hoc network connected by said mobile terminal
itself.

6 The mobile terminal defined in claim 2, wherein said
destination address capture means comprises:

- a. ad hoc/ infrastructure network identification means
for receiving said receive packet, identifying
whether or not a network to which said mobile
terminal is connected is said infrastructure network
or said ad hoc network, outputting a network
identification signal representing a network to be
connected to a network connected by said mobile
terminal, outputting an infrastructure network
connection signal when said network to be connected
is said infrastructure network, and outputting an ad
hoc network connection signal when said network to be

connected is said ad hoc network;

- b. a first switch for receiving the name of said opposite communication party's name of said mobile terminal itself and said network identification signal and selecting a destination of said opposite communication party's name based on said network identification signal;
- c. infrastructure network/ destination address capture means for receiving said infrastructure network connection signal and said opposite communication party's name, transmitting a message requesting a terminal address corresponding to said communication opponent's name, detecting a message containing a terminal address corresponding to said opposite communication party's name from said receive packet, and outputting said terminal address corresponding to said opposite communication party's name;
- d. ad hoc network/ destination address capture means for receiving said ad hoc network connection signal and said opposite communication party's name, transmitting a message requesting a terminal address corresponding to said opposite communication party's name, detecting a message containing a terminal address corresponding to said opposite communication party's name from said receive packet, and outputting

said terminal address corresponding to said opposite communication party's name;

5 e. a second switch for selectively outputting a terminal address corresponding to said opposite communication party's name captured by said infrastructure network/ destination address capture means and a terminal address corresponding to said opposite communication party's name captured by said ad hoc network/ destination address capture means, based on said network identification signal; and

10 f. a third switch for selectively transmitting a message requesting a terminal address corresponding to said opposite communication party's name captured by said infrastructure network/ destination address capture means and a message requesting a terminal address corresponding to said opposite communication party's name captured by said ad hoc/ destination address capture means, based on said network identification signal.

15 7 The mobile terminal defined in claim 6, wherein said ad hoc network/ destination address capture means comprises:

20 a. destination terminal address detection means for receiving said network identification signal, starting up when a connection network of said mobile terminal itself is an ad hoc network, receiving said

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receive packet and said opposite communication party's name, outputting the terminal address of said opposite communication party's name by detecting a destination address message containing correspondence relationships between said opposite communication party's name and said opposite communication party's terminal address from said receive packet, and outputting a terminal address capture signal of said opposite communication party;

b. destination terminal address request message output means for receiving said opposite communication party's name, broadcasting as said transmission packet a message requesting the correspondence relationship between said opposite communication party's name and said opposite communication party's terminal to a communication medium in which a connection network of said mobile terminal itself configures an ad hoc network, and outputting a timer start-up signal;

c. a timer for starting measuring a predetermined period of time in response to said timer start-up signal, ceasing measurement of said predetermined period of time when a terminal address capture signal of said opposite communication party is received during measuring said predetermined period of time,

- d. terminal address non-capture detection means for outputting a terminal address non-capture signal representing that a terminal address corresponding to said opposite communication party's name cannot be captured, when said time-out signal is received;
- e. a control circuit for outputting a switch control pulse that selects said terminal address non-capture signal when said time-out signal is input and selects a terminal address capture signal of said opposite communication party when a terminal address capture signal of said opposite communication party is input;
- f. a switch for selectively outputting said terminal address non-capture signal or said terminal address capture signal of said opposite communication party, based on said switch control pulse;
- g. destination terminal address request message detection means for detecting said destination terminal address request message in response to said receive packet and then outputting said destination address message transmission request signal when said destination terminal address request message requests a terminal address to the name of said mobile

terminal itself; and

h. destination terminal address message transmission means for broadcasting as said transmission packet said destination terminal address message containing its own terminal address to a communication medium in which a connection network of said mobile terminal configures an ad hoc network, when said destination address message message transmission request signal is input.

8 The mobile terminal defined in claim 6, wherein said ad hoc/ infrastructure network identification means comprises:

a. infrastructure network advertisement message receive means for receiving an infrastructure network advertisement message containing a network address of an infrastructure network in response to said receive packet, and outputting an infrastructure network advertisement message receive signal representing that said infrastructure network advertisement message has been received when said infrastructure network advertisement message contains a network address equal to a network address of a network connected by said mobile terminal itself;

b. ad hoc network advertisement receive means for receiving an ad hoc network advertisement message

containing a network address of an ad hoc network in response to said receive packet, and outputting an ad hoc network advertisement message receive signal representing that said ad hoc network advertisement message has been received when said ad hoc network advertisement message contains a network address equal to a network address of a network connected by said mobile terminal itself;

- c. a first counter for performing a reset operation by receiving said ad hoc network advertisement message receive signal and a reset signal, counting the number of said ad hoc network advertisement messages, and outputting the number of said ad hoc network advertisement messages every time said reset signal is input;
- d. a second counter for performing a reset operation by receiving said infrastructure network advertisement message receive signal and a reset signal, counting the number of said infrastructure network advertisement messages, and outputting the number of said infrastructure network advertisement messages every time said reset signal is input;
- e. a timer for measuring a predetermined period of time and outputting said reset signal when a time-out occurs;

f. a first comparator for comparing an output of said first counter with zero to determine a comparison result, and outputting said comparison result as said infrastructure network connection signal to said decoder that creates said network identification signal; and

g. a second comparator for comparing an output of said second counter with zero to determine a comparison result, and outputting said comparison result as said ad hoc network connection signal to said decoder that creates said network identification signal;

h. wherein said decoder that creates said network identification signal receives said infrastructure connection signal from said first counter and said ad hoc network connection signal from said second counter.

9 The mobile terminal defined in claim 2, wherein said mobile management means comprises:

a. network advertisement request message transmission means for detecting said infrastructure network advertisement message or said ad hoc network advertisement message containing a network address of a network to which said mobile terminal is connected, in response to said receive packet, detecting that said mobile terminal has been moved to a different

network when said infrastructure network advertisement message or said ad hoc network advertisement message cannot be received for a predetermined period of time, and transmitting said infrastructure network advertisement message or said ad hoc network advertisement request message requesting the network address of said network; and

b. ad hoc network advertisement means for receiving said receive packet when a network to which said mobile terminal is connected is an ad hoc network, and transmitting said ad hoc network advertisement message representing the presence of said ad hoc network in cooperation with another mobile terminal connected to said ad hoc network.

10 The mobile terminal defined in claim 9, wherein said network advertisement request message transmission means comprises:

a. infrastructure network advertisement message receive means for receiving an infrastructure network advertisement message containing a network address of an infrastructure network in response to said receive packet, and outputting an infrastructure network advertisement message receive signal representing that said infrastructure network advertisement message has been received when said infrastructure

network advertisement message contains a network address equal to the network address of a network to which said mobile terminal itself is connected;

- 5 b. ad hoc network advertisement message receiving means for receiving an ad hoc network advertisement message containing a network address of an ad hoc network in response to said receive packet, and for outputting an ad hoc network advertisement message receive
- 10 signal representing that said ad hoc network advertisement message has been received when said ad hoc network advertisement message contains a network address equal to a network address of a network to which said mobile terminal itself is connected;
- 15 c. a first counter for performing a reset operation by receiving said ad hoc network advertisement message receive signal and a reset signal, counting the number of ad hoc network advertisement messages, and outputting the number of said ad hoc network
- 20 advertisement messages every time said reset signal is received;
- 25 d. a second counter for performing a reset operation by receiving said infrastructure network advertisement message receive signal and said reset signal, counting the number of infrastructure network advertisement messages, and outputting the number of

said infrastructure network advertisement messages
every time said reset signal is received;

- e. a timer for measuring a predetermined period of time
and then outputting said rest signal when a time-out
occurs;
- f. an adder for adding an output from said first
counter and an output from said second counter;
- g. a comparator for comparing the output from said
adder with zero to obtain a result, and outputting an
advertisement message non-receive signal when said
result equals zero;
- h. infrastructure network advertisement request message
transmission means for broadcasting said
infrastructure network advertisement request message
onto a communication medium used by said mobile
terminal itself when said advertisement message non-
receive signal is received; and
- i. ad hoc network advertisement request message
transmission means for broadcasting said ad hoc
network advertisement request message onto the
communication medium used by said mobile terminal
itself when said advertisement message non-receive
signal is received.

11 A method of controlling a movable terminal, comprising
the step of:

providing information to a first mobile terminal
connected to an ad hoc network being a temporary
network configured of only plural terminals, wherein
another mobile terminal starts up a random timer in
5 response to an information request from a mobile
terminal; wherein said random timer allows only a
terminal which has first occurred a time-out to
supply information.

12 A mobile terminal controlling method including a
10 procedure of providing information to a mobile terminal,
said mobile terminal being connected to an ad hoc network
being a temporary network configured of only plural
terminals, comprising the steps of:

- 15 a. broadcasting an information requesting message to
all mobile terminals connected to said ad hoc network
by means of a first mobile terminal connected to an
ad hoc network;
- b. starting up said random timer by means of each of
said mobile terminals configuring said ad hoc network
20 which receives said information requesting message,
said random timer measuring a random time;
- c. broadcasting information supply message
corresponding to said information requesting message
to all mobile terminals connected to said ad hoc
25 network by means of a mobile terminal in which time-

out of said random timer has occurred among mobile terminals which have started up said random timer; and

- d. ceasing said random timer when each of said mobile terminals which have started up said random timer receives said information supply message and then stopping said information supply message from being transmitted.

13 A method of controlling a mobile terminal, comprising the step of:

providing information from a terminal with a shortest ad hoc network connection time when information is provided to a first mobile terminal connected to said ad hoc network being a temporary network configured of only plural terminals.

14 A mobile terminal controlling method including a procedure of providing information to a mobile terminal, said mobile terminal being connected to an ad hoc network being a temporary network configured of only plural terminals, comprising the steps of:

- a. broadcasting an information request message to all mobile terminals connected to an ad hoc network by means of a first mobile terminal connected to said ad hoc network;
- b. determining an ad hoc network connection time based

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